06578 "E5798260

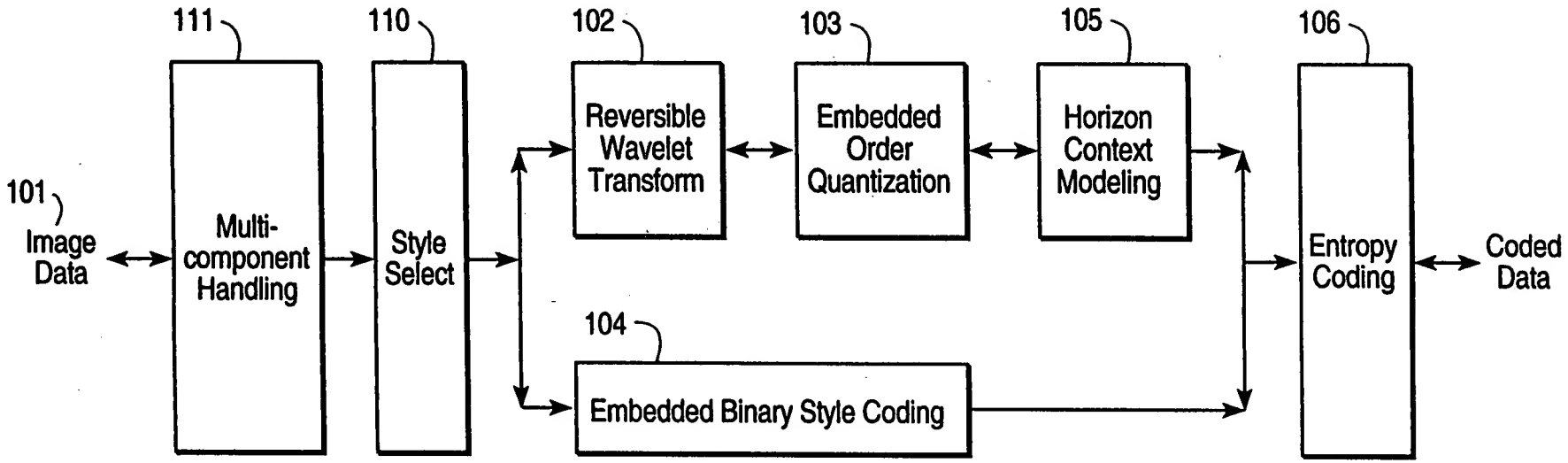

FIG. 1

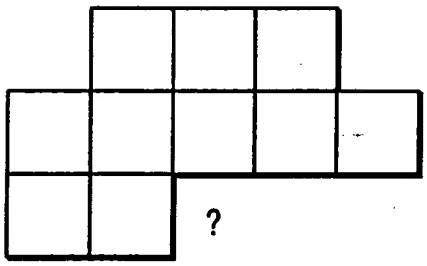

FIG. 2A

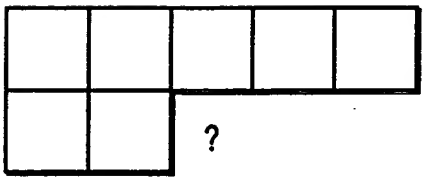

FIG. 2B

86570-852626

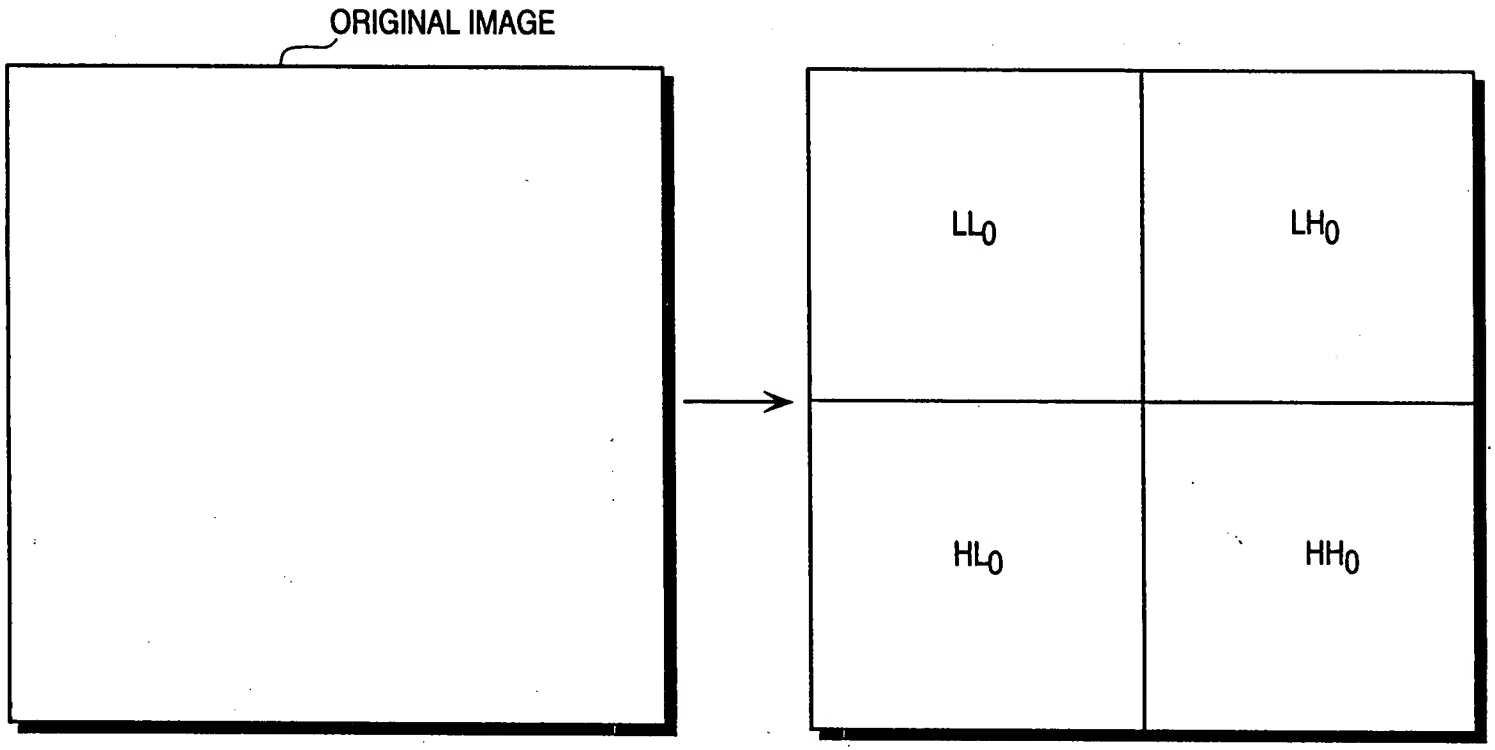

FIG. 3A

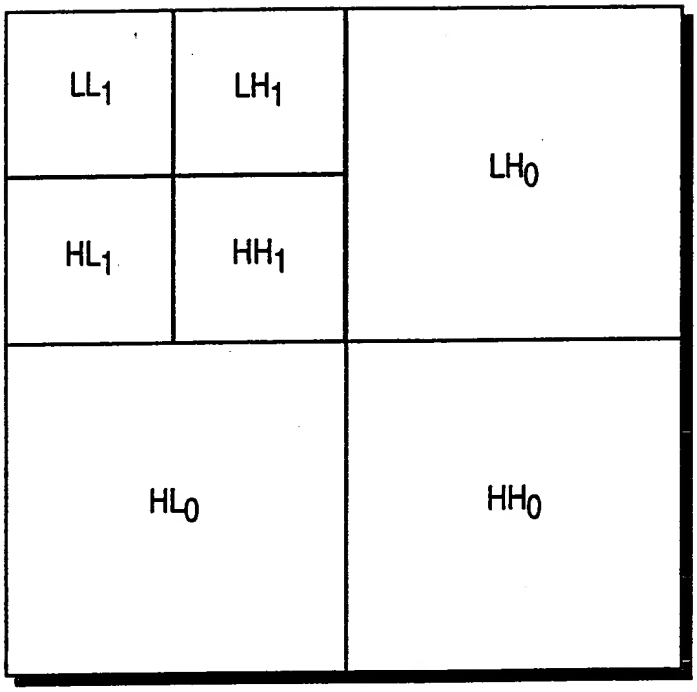

FIG. 3B

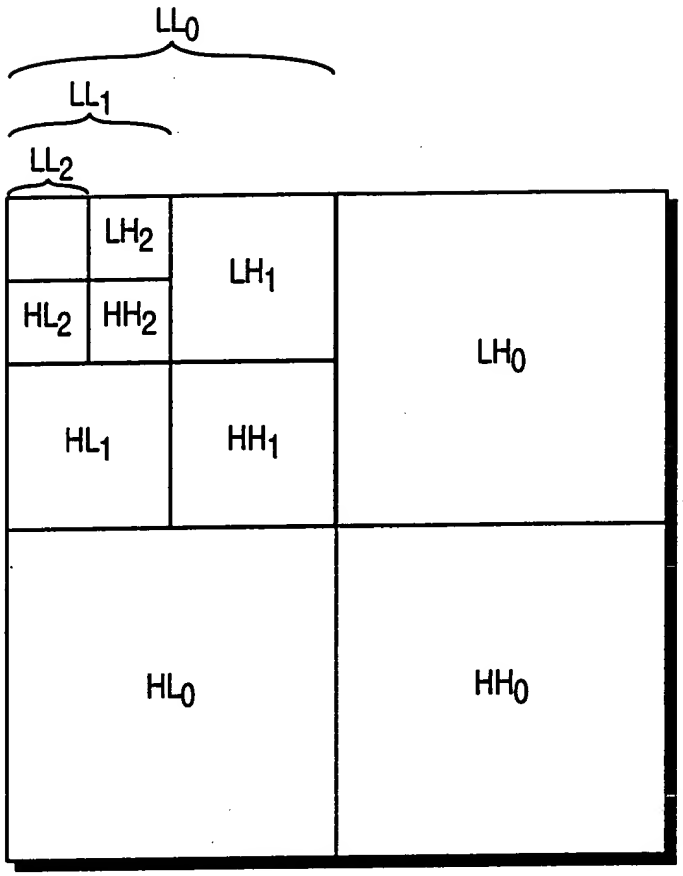

FIG. 3C

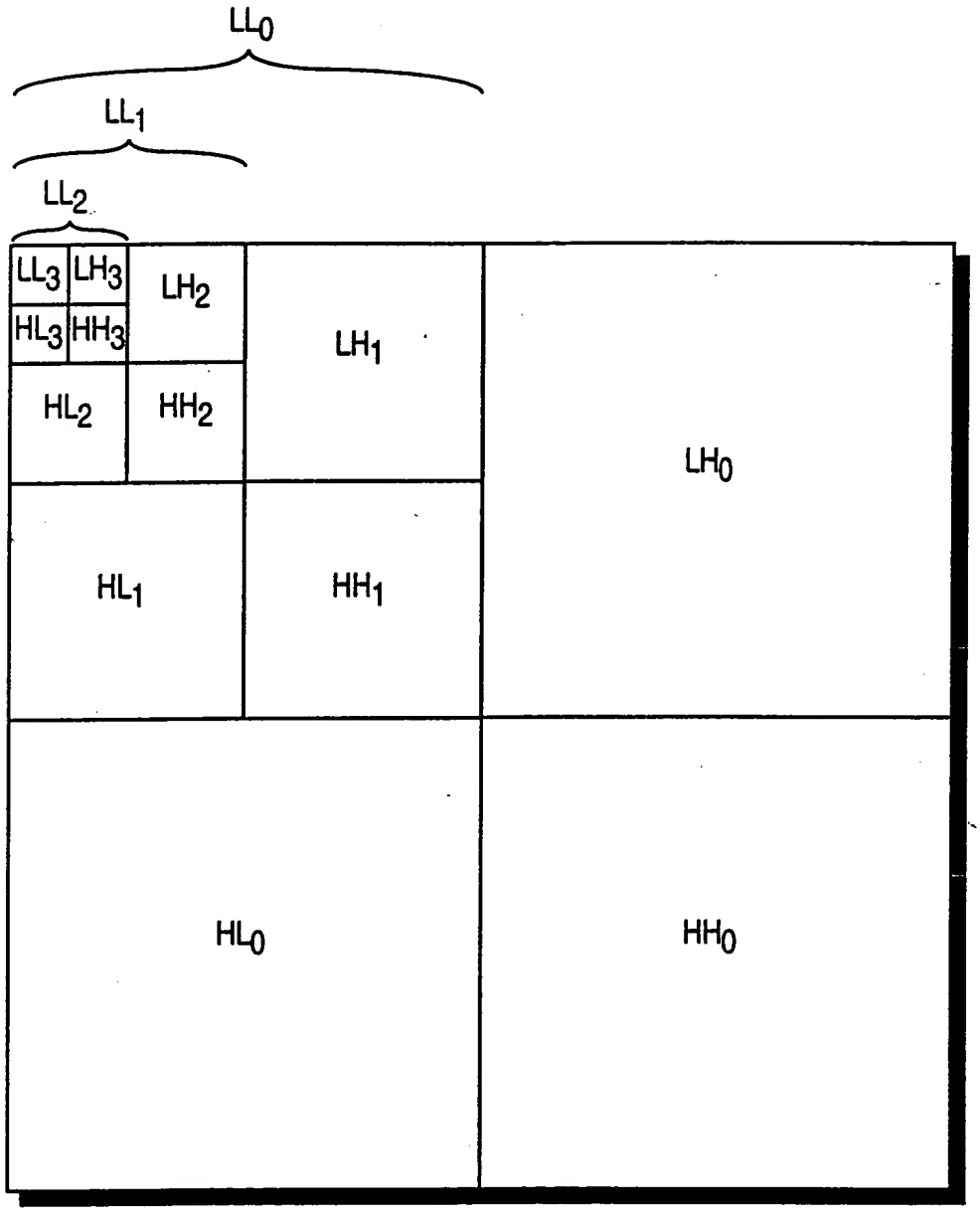

FIG. 3D

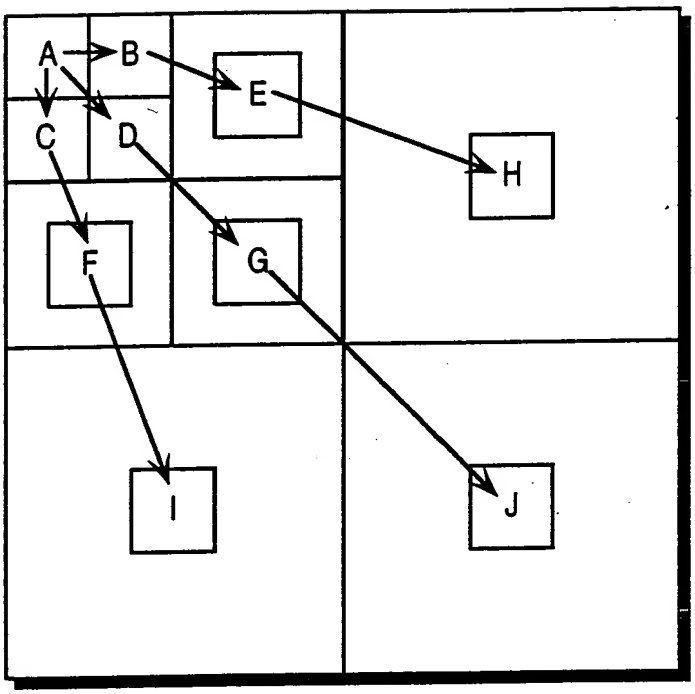

FIG. 4

6052F0 "E5Z9E260

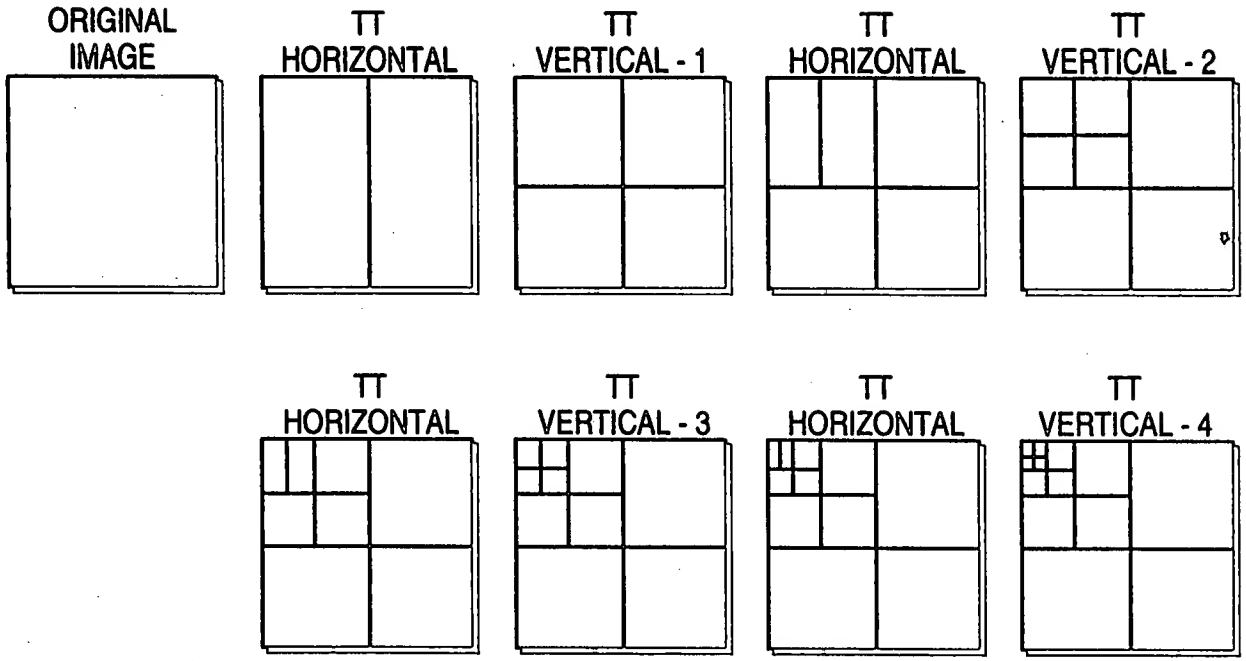

FIG. 5A

8858T8 "2542250

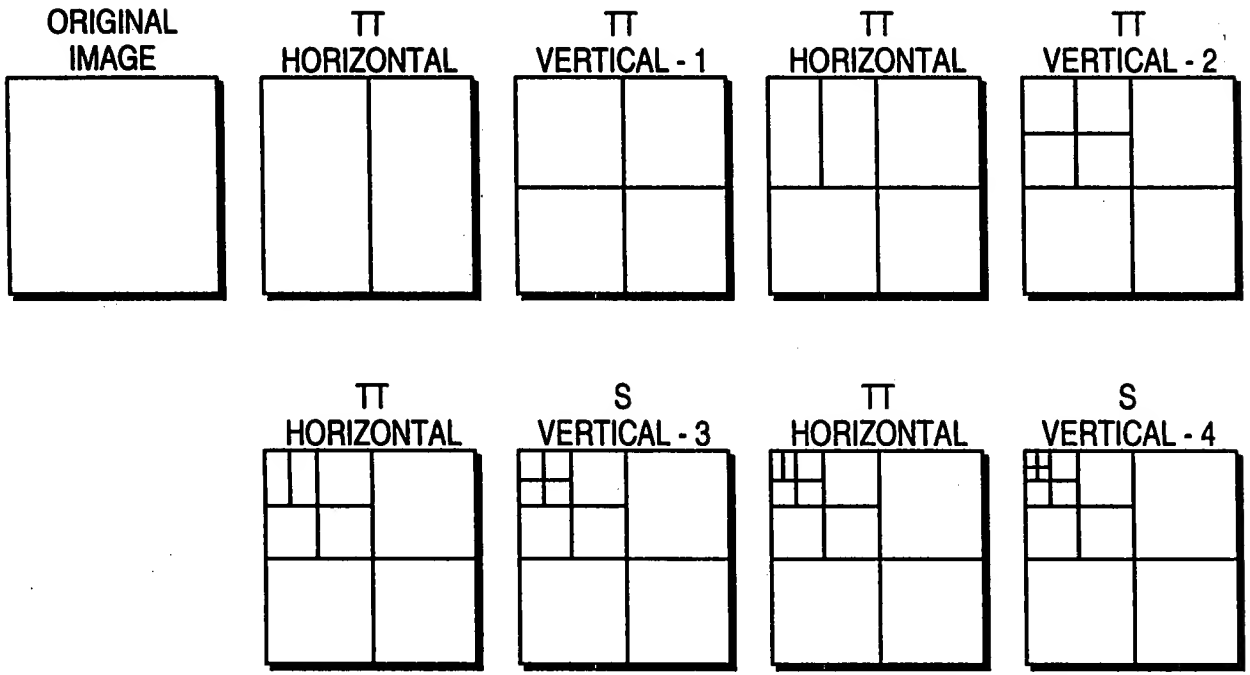

FIG. 5B

0	1	2	3	4	5	
6	7	8	9	10	11	
12	13	14	15	16	17	
18	19	20	21	22	23	
24	25	26	27	28	29	
30	31	32	33	34	35	
36	37	38	39	40	41	

FIG. 6

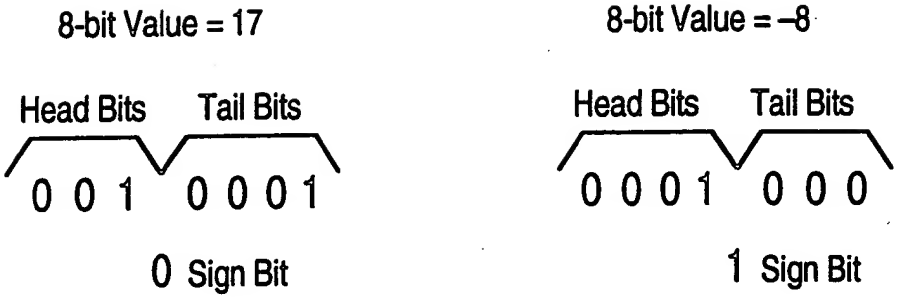
8-bit Value = 17
Head Bits
Tail Bits
0 0 1 0 0 0 1
0 Sign Bit
8-bit Value = –8
Head Bits
Tail Bits
0 0 0 1 0 0 0
1 Sign Bit

FIG. 7

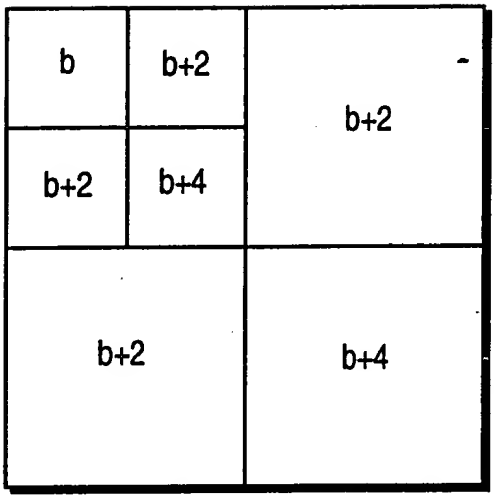

FIG. 8A

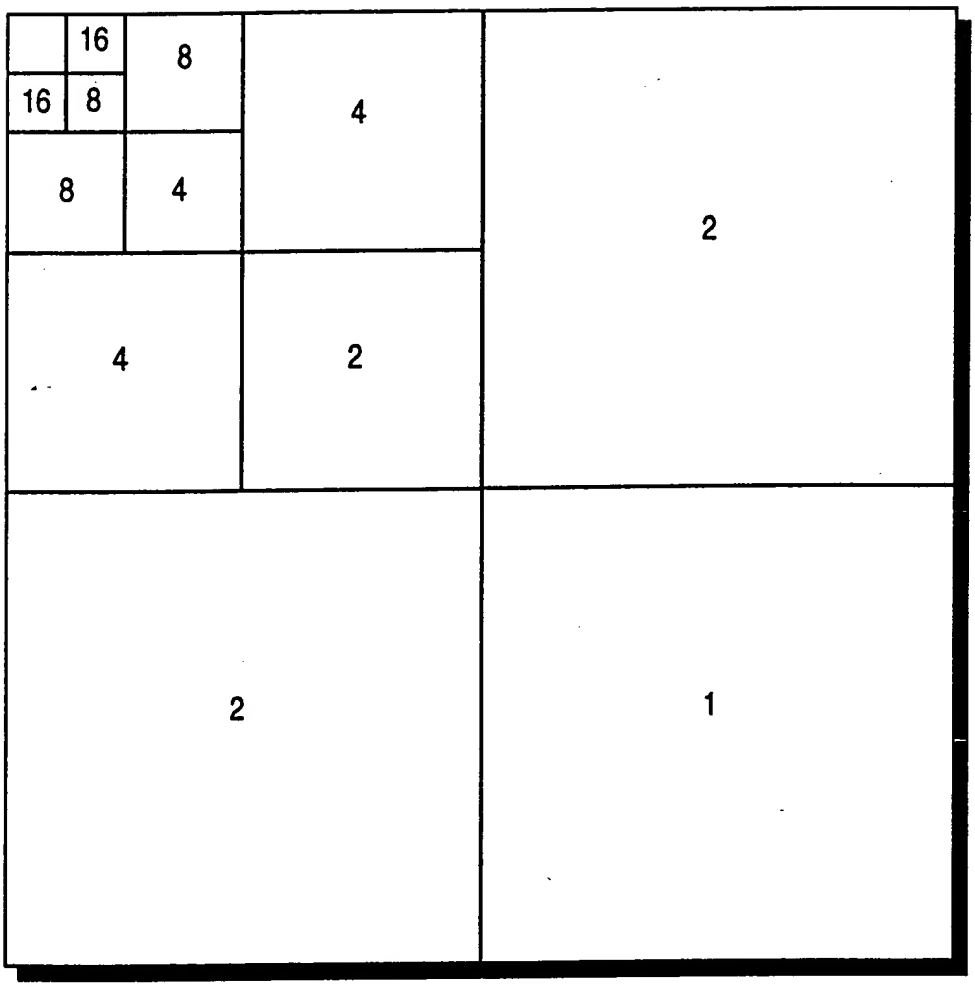

FIG. 8B

6652T0 "E5/9E2A0

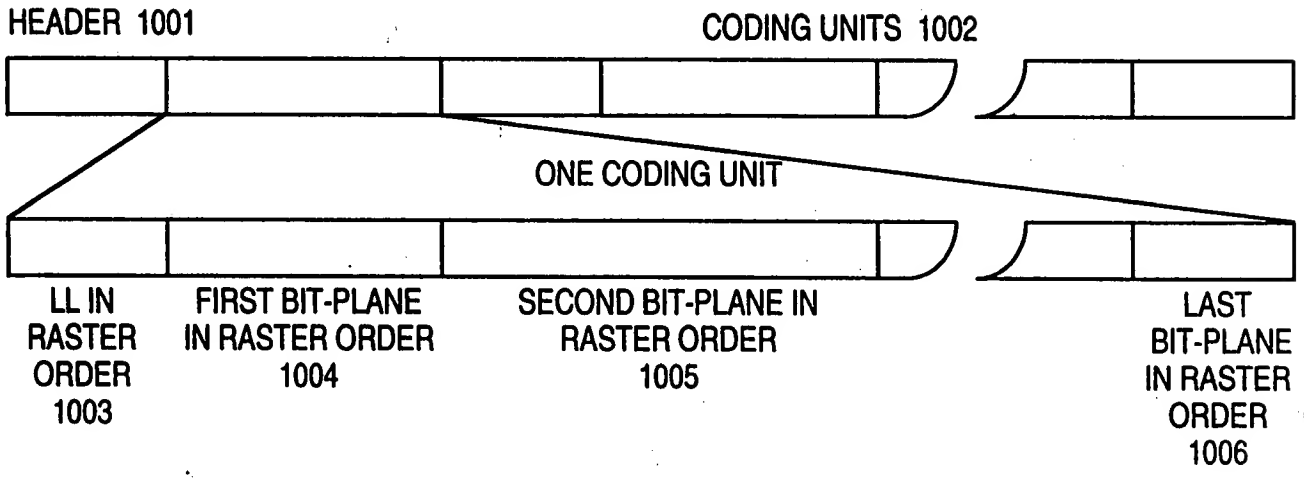

FIG. 9

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NW	N	NE
W	P	E
SW	S	SE

FIG. 10

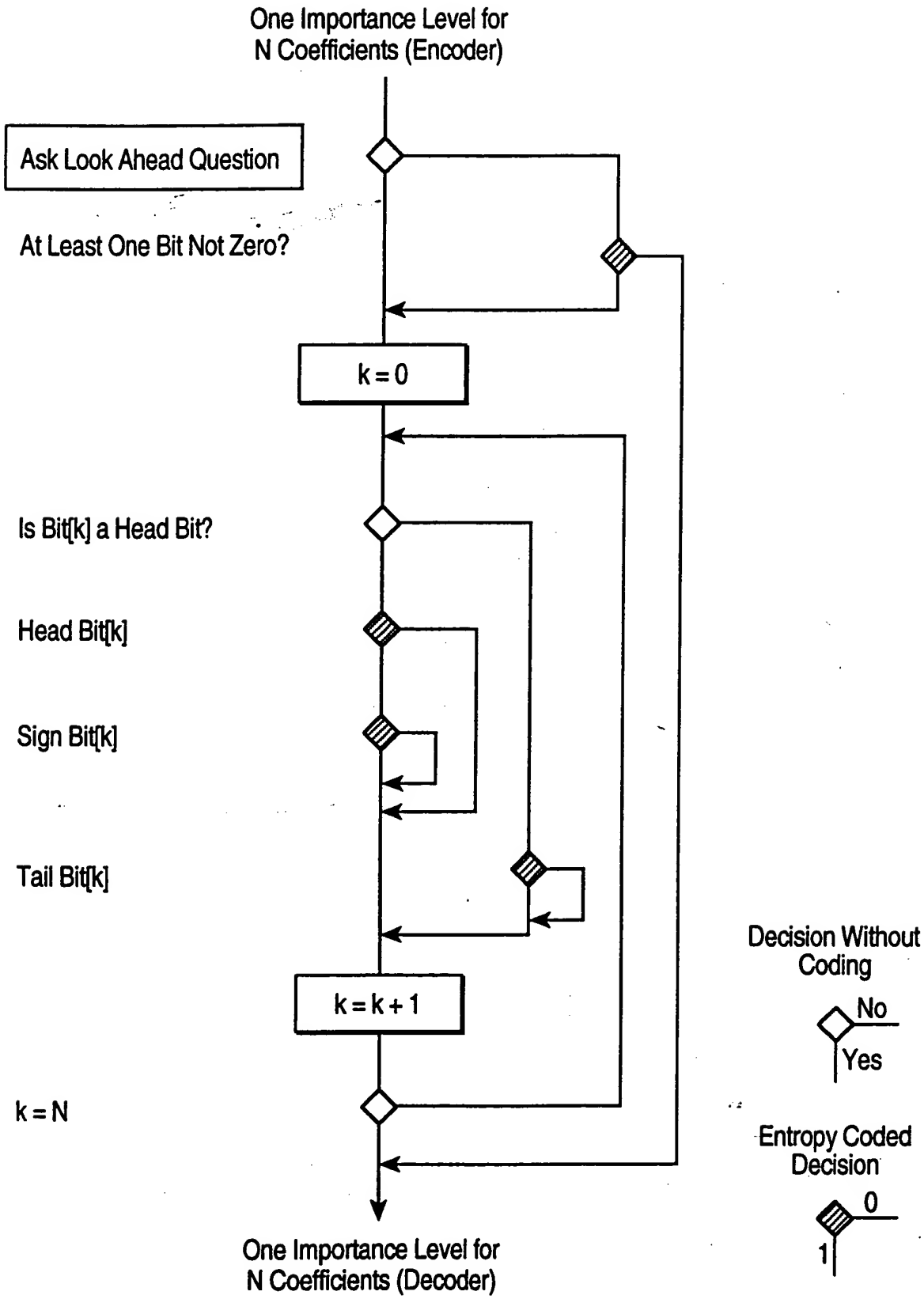

One Importance Level for
N Coefficients (Encoder)
Ask Look Ahead Question
At Least One Bit Not Zero?
k = 0
Is Bit[k] a Head Bit?
Head Bit[k]
Sign Bit[k]
Tail Bit[k]
k = k + 1
k = N
One Importance Level for
N Coefficients (Decoder)
Decision Without
Coding
No
Yes
Entropy Coded
Decision
0
1

FIG. 11

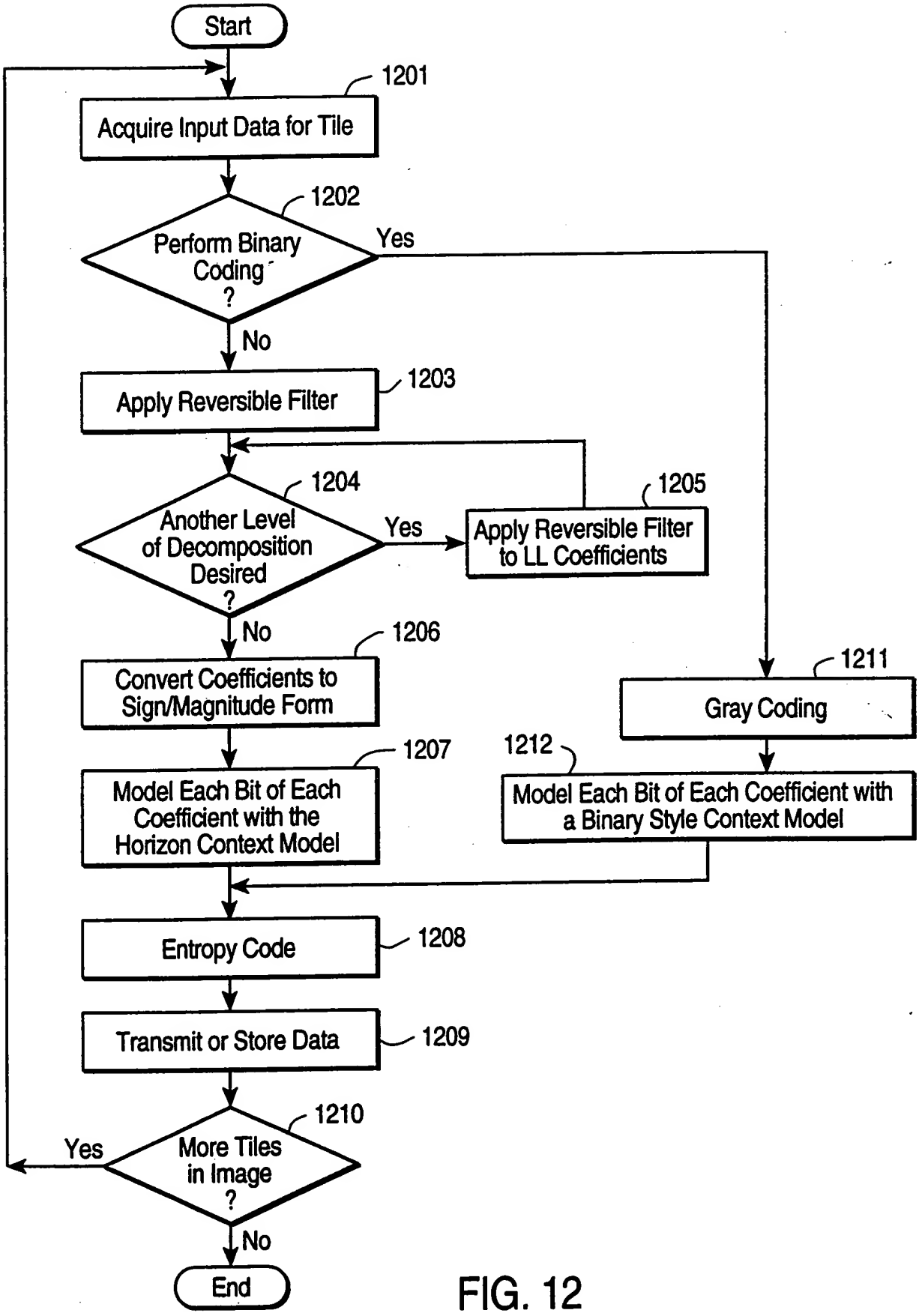

Start
1201
Acquire Input Data for Tile
1202
Perform Binary Coding ?
Yes
No
1203
Apply Reversible Filter
1204
Another Level of Decomposition Desired ?
Yes
1205
Apply Reversible Filter to LL Coefficients
No
1206
Convert Coefficients to Sign/Magnitude Form
1207
Model Each Bit of Each Coefficient with the Horizon Context Model
1211
Gray Coding
1212
Model Each Bit of Each Coefficient with a Binary Style Context Model
Entropy Code
1208
Transmit or Store Data
1209
1210
More Tiles in Image ?
Yes
No
End

FIG. 12

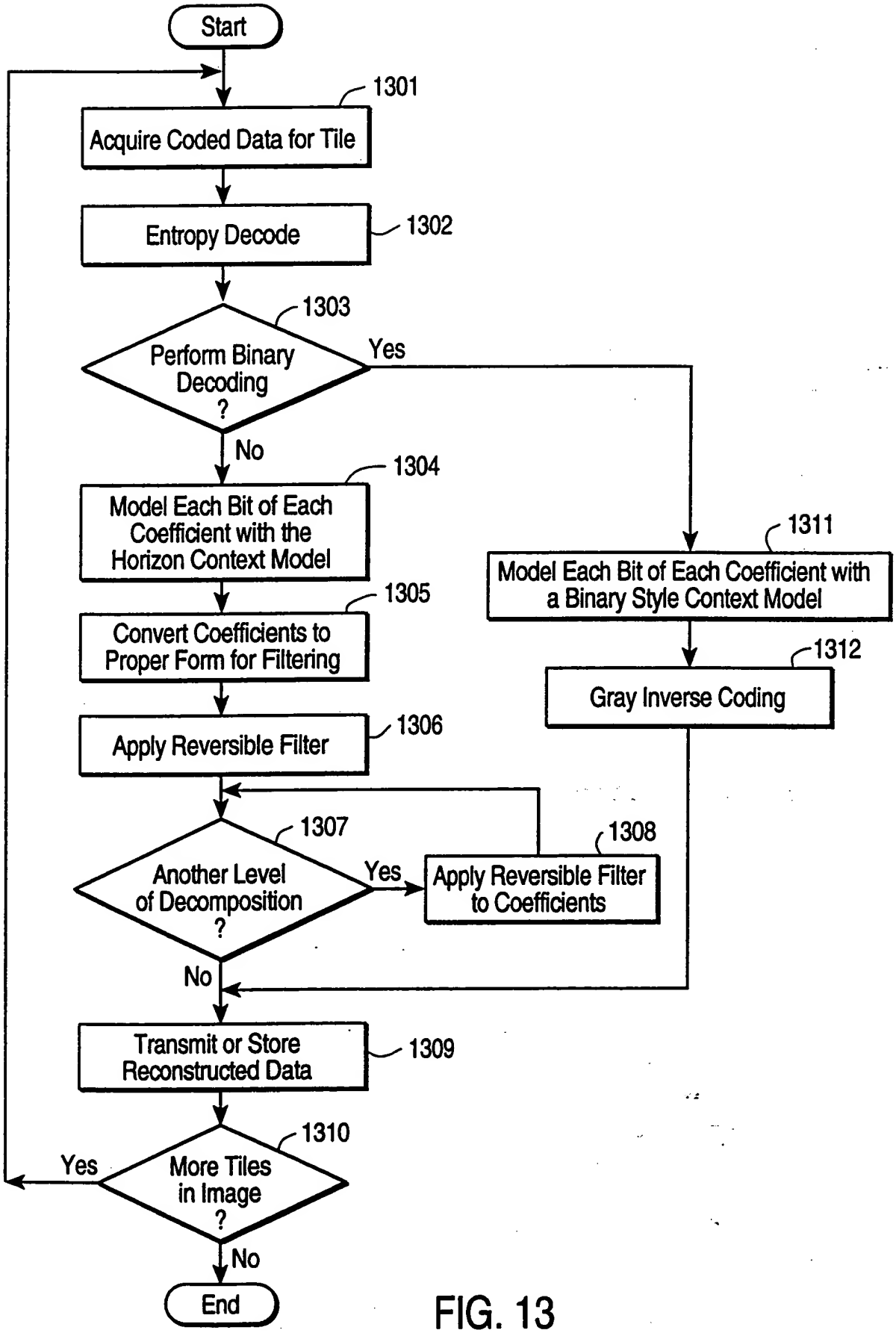

Start
1301
Acquire Coded Data for Tile
Entropy Decode
1302
1303
Perform Binary Decoding ?
Yes
No
1304
Model Each Bit of Each Coefficient with the Horizon Context Model
1305
Convert Coefficients to Proper Form for Filtering
1306
Apply Reversible Filter
1307
Another Level of Decomposition ?
Yes
1308
Apply Reversible Filter to Coefficients
No
1311
Model Each Bit of Each Coefficient with a Binary Style Context Model
1312
Gray Inverse Coding
Transmit or Store Reconstructed Data
1309
1310
More Tiles in Image ?
Yes
No
End

FIG. 13

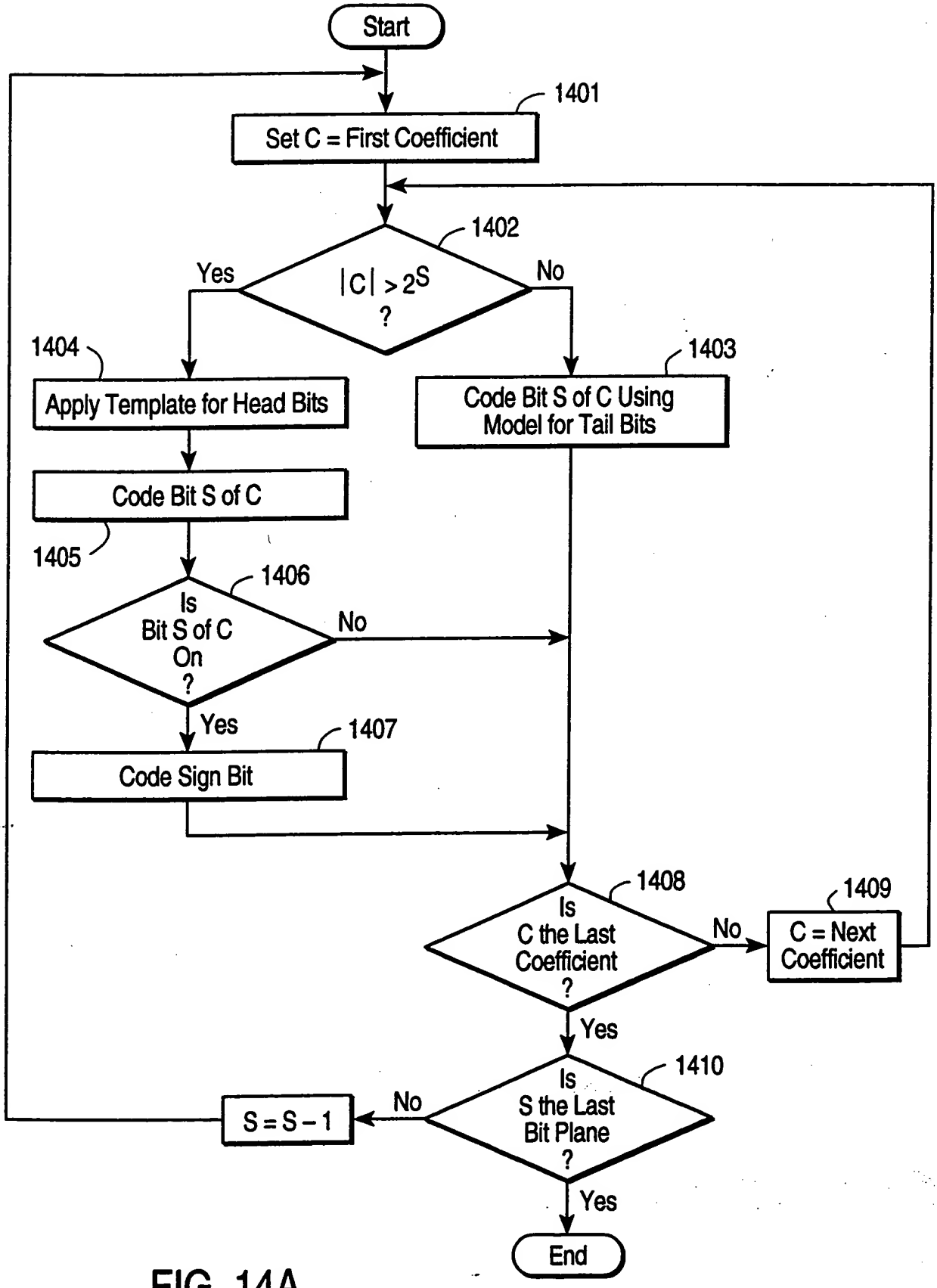

Start
1401
Set C = First Coefficient
1402
|C| > 2^S ?
Yes
No
1404
Apply Template for Head Bits
1403
Code Bit S of C Using Model for Tail Bits
Code Bit S of C
1405
1406
Is Bit S of C On ?
No
Yes
1407
Code Sign Bit
1408
Is C the Last Coefficient ?
No
1409
C = Next Coefficient
Yes
1410
Is S the Last Bit Plane ?
No
S = S - 1
Yes
End

FIG. 14A

Parent (optional)

Tail Info (2)

	Tail On (1)	
Tail Info (2)		Tail On (1)
Tail On (1)	Tail On (1)	

FIG. 14B

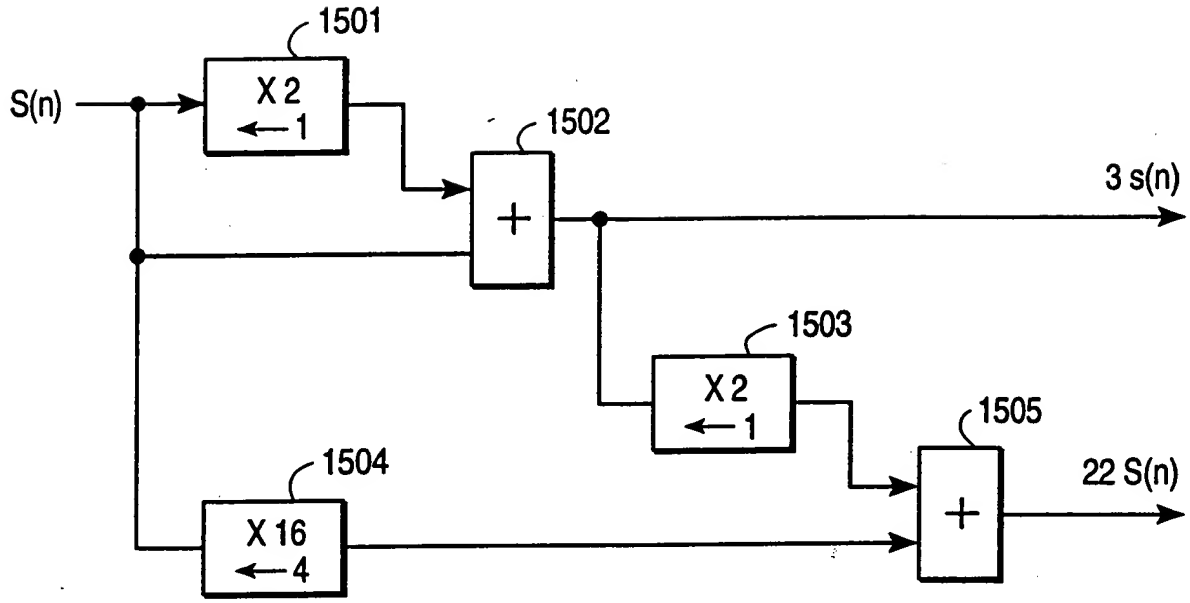


FIG. 15

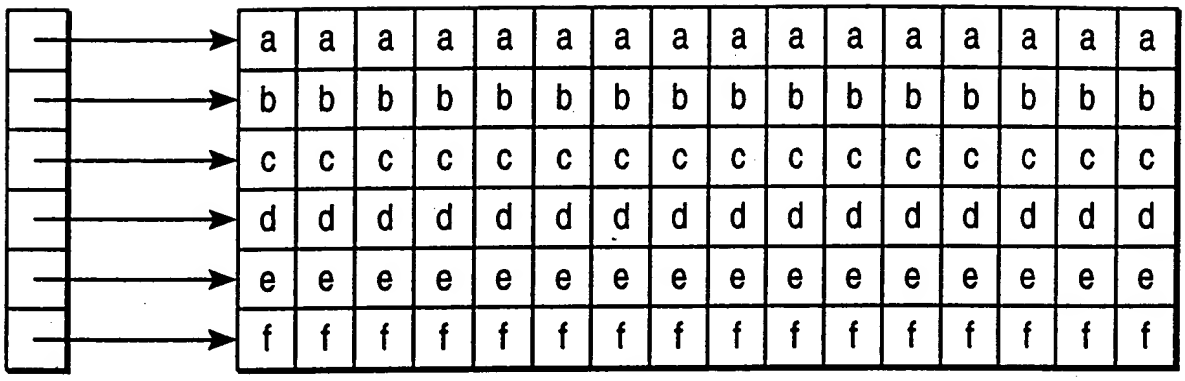


FIG. 16A

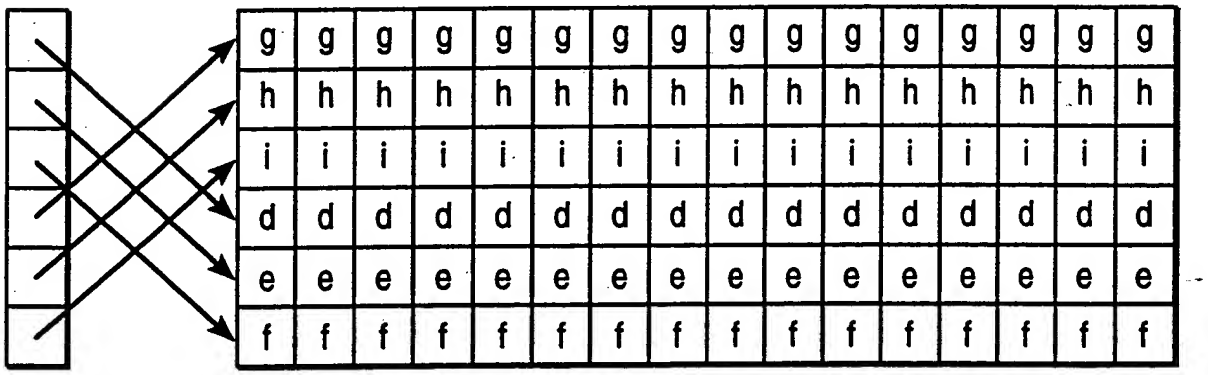


FIG. 16B

S_{n-1}	D_{n-1}	S_n	B_n	X_{2n+2}	X_{2n+3}	X_{2n+4}	X_{2n+5}

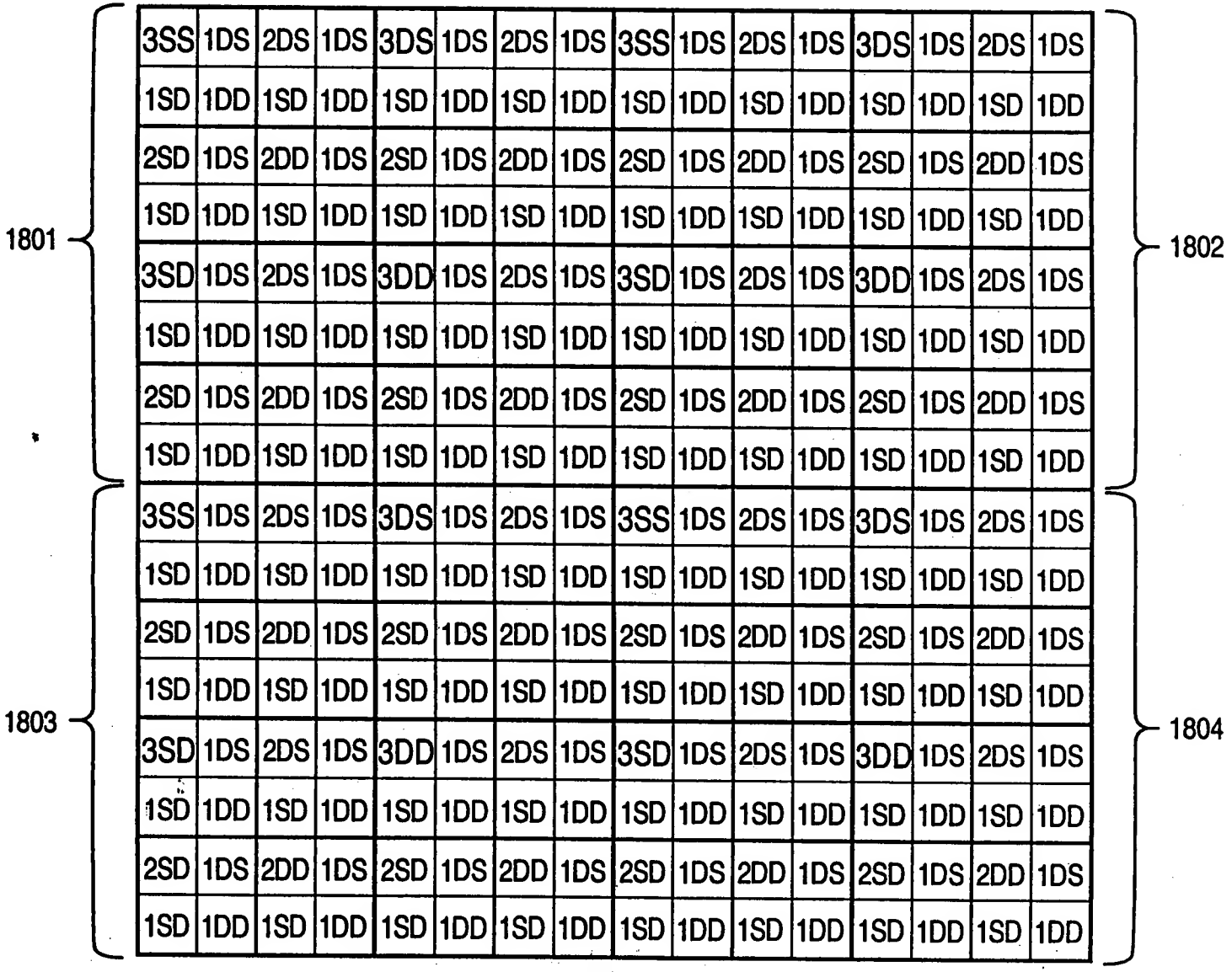
FIG. 17A

S_{n-1}	D_{n-1}	S_n	B_n	S_{n+1}	B_{n+1}	X_{2n+4}	X_{2n+5}

FIG. 17B

S_{n-1}	D_{n-1}	S_n	D_n	S_{n+1}	B_{n+1}	X_{2n+4}	X_{2n+5}

FIG. 17C



3SS	1DS	2DS	1DS	3DS	1DS	2DS	1DS	3SS	1DS	2DS	1DS	3DS	1DS	2DS	1DS
1SD	1DD	1SD	1DD	1SD	1DD	1SD	1DD	1SD	1DD	1SD	1DD	1SD	1DD	1SD	1DD
2SD	1DS	2DD	1DS	2SD	1DS	2DD	1DS	2SD	1DS	2DD	1DS	2SD	1DS	2DD	1DS
1SD	1DD	1SD	1DD	1SD	1DD	1SD	1DD	1SD	1DD	1SD	1DD	1SD	1DD	1SD	1DD
3SD	1DS	2DS	1DS	3DD	1DS	2DS	1DS	3SD	1DS	2DS	1DS	3DD	1DS	2DS	1DS
1SD	1DD	1SD	1DD	1SD	1DD	1SD	1DD	1SD	1DD	1SD	1DD	1SD	1DD	1SD	1DD
2SD	1DS	2DD	1DS	2SD	1DS	2DD	1DS	2SD	1DS	2DD	1DS	2SD	1DS	2DD	1DS
1SD	1DD	1SD	1DD	1SD	1DD	1SD	1DD	1SD	1DD	1SD	1DD	1SD	1DD	1SD	1DD
3SS	1DS	2DS	1DS	3DS	1DS	2DS	1DS	3SS	1DS	2DS	1DS	3DS	1DS	2DS	1DS
1SD	1DD	1SD	1DD	1SD	1DD	1SD	1DD	1SD	1DD	1SD	1DD	1SD	1DD	1SD	1DD
2SD	1DS	2DD	1DS	2SD	1DS	2DD	1DS	2SD	1DS	2DD	1DS	2SD	1DS	2DD	1DS
1SD	1DD	1SD	1DD	1SD	1DD	1SD	1DD	1SD	1DD	1SD	1DD	1SD	1DD	1SD	1DD
3SD	1DS	2DS	1DS	3DD	1DS	2DS	1DS	3SD	1DS	2DS	1DS	3DD	1DS	2DS	1DS
1SD	1DD	1SD	1DD	1SD	1DD	1SD	1DD	1SD	1DD	1SD	1DD	1SD	1DD	1SD	1DD
2SD	1DS	2DD	1DS	2SD	1DS	2DD	1DS	2SD	1DS	2DD	1DS	2SD	1DS	2DD	1DS
1SD	1DD	1SD	1DD	1SD	1DD	1SD	1DD	1SD	1DD	1SD	1DD	1SD	1DD	1SD	1DD

FIG. 18

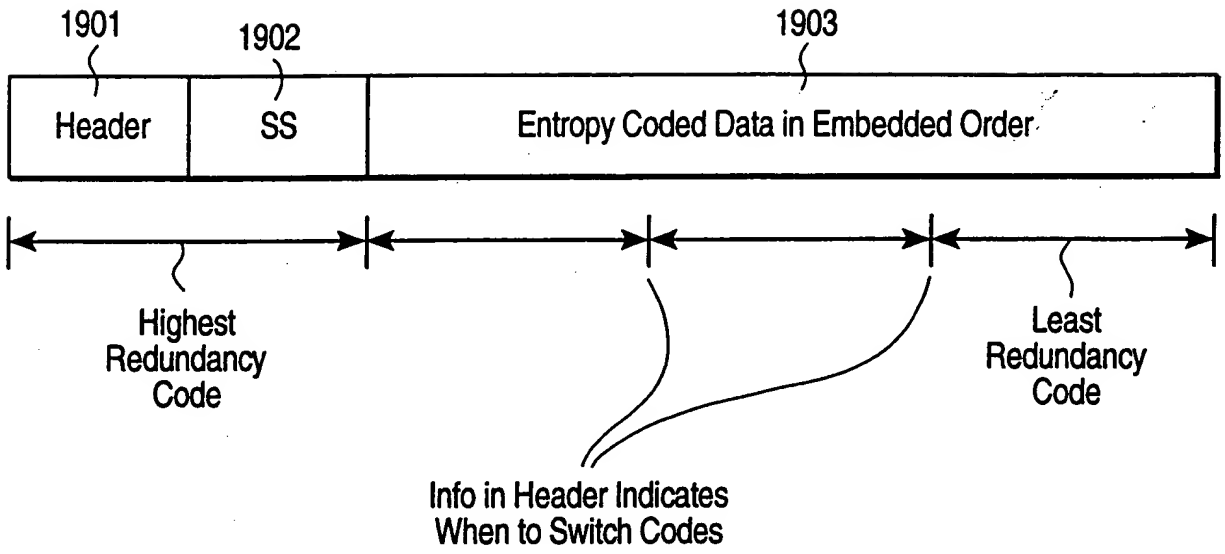

1901
1902
1903
Header
SS
Entropy Coded Data in Embedded Order
Highest Redundancy Code
Least Redundancy Code
Info in Header Indicates When to Switch Codes

FIG. 19

6052T0 "E5Z9E20

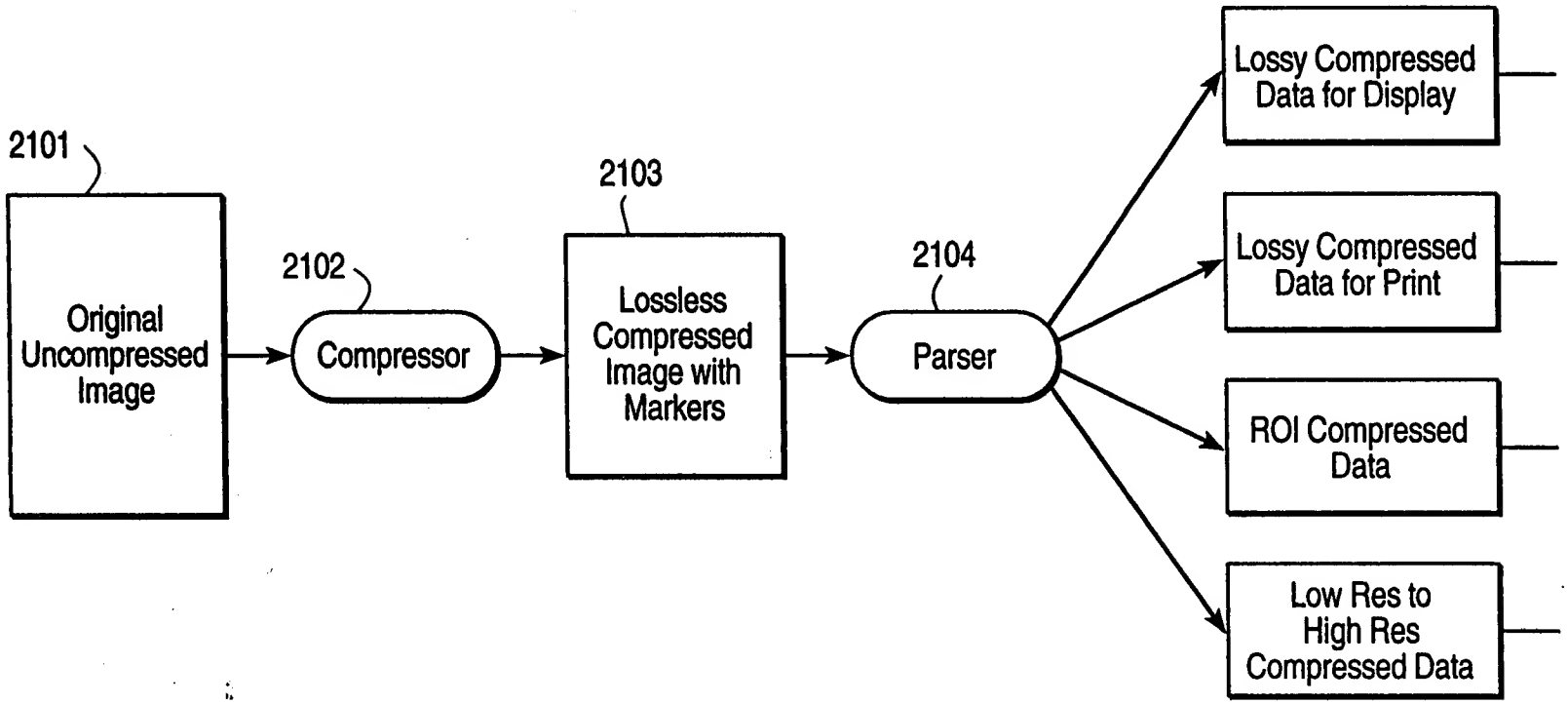


FIG. 21A

0652F0 "E5Z9E20

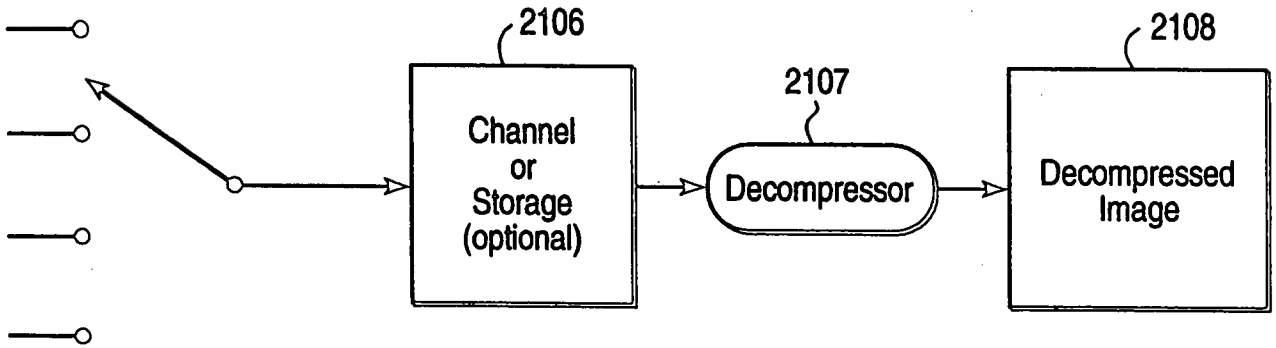


FIG. 21B

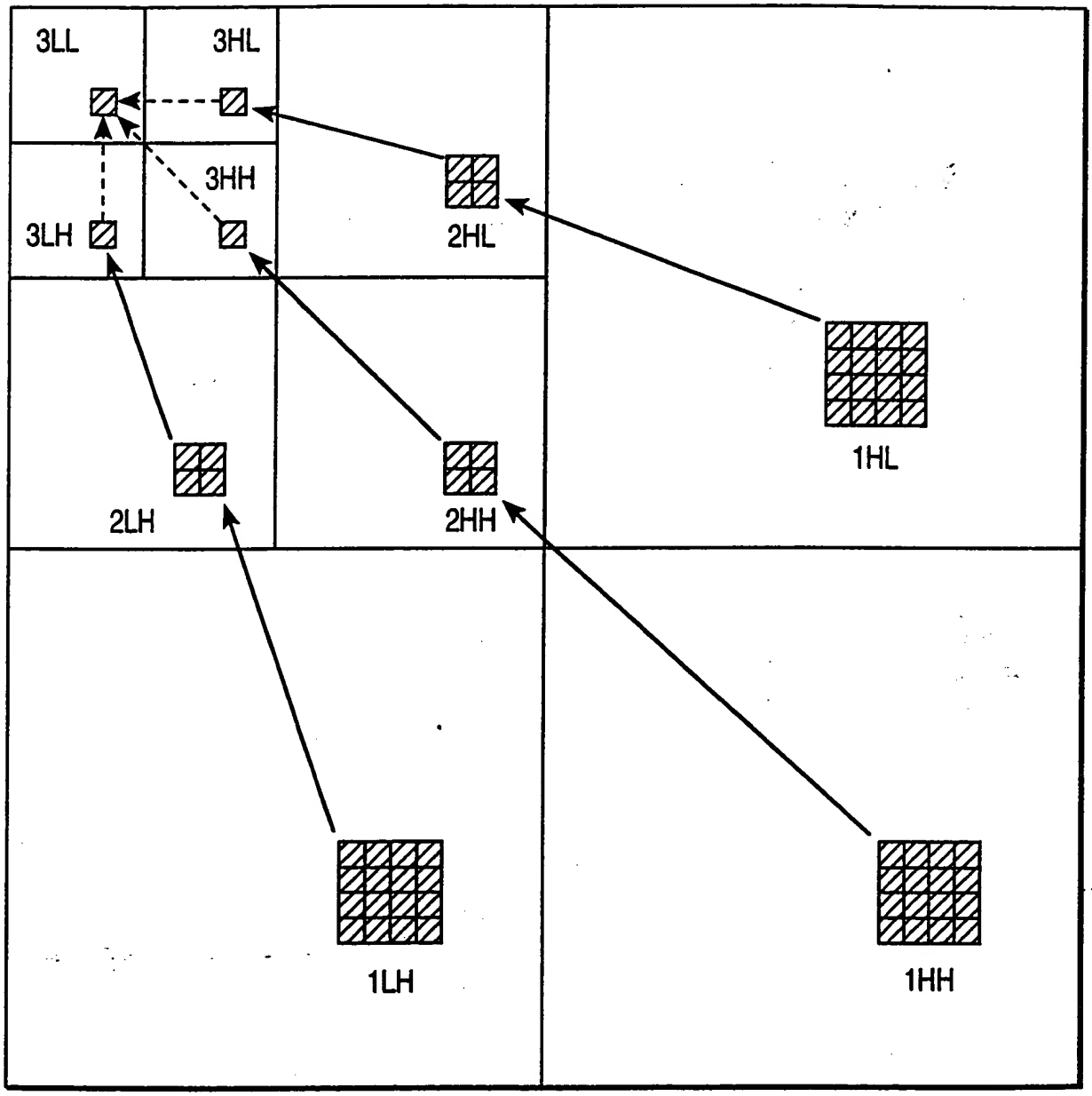


FIG. 22

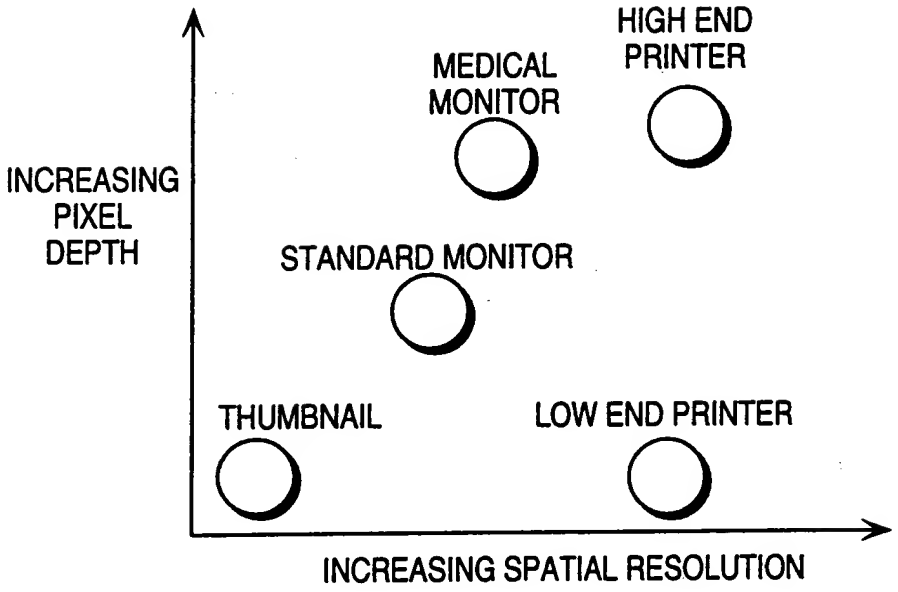

HIGH END
PRINTER
MEDICAL
MONITOR
INCREASING
PIXEL
DEPTH
STANDARD MONITOR
THUMBNAIL
LOW END PRINTER
INCREASING SPATIAL RESOLUTION

FIG. 23

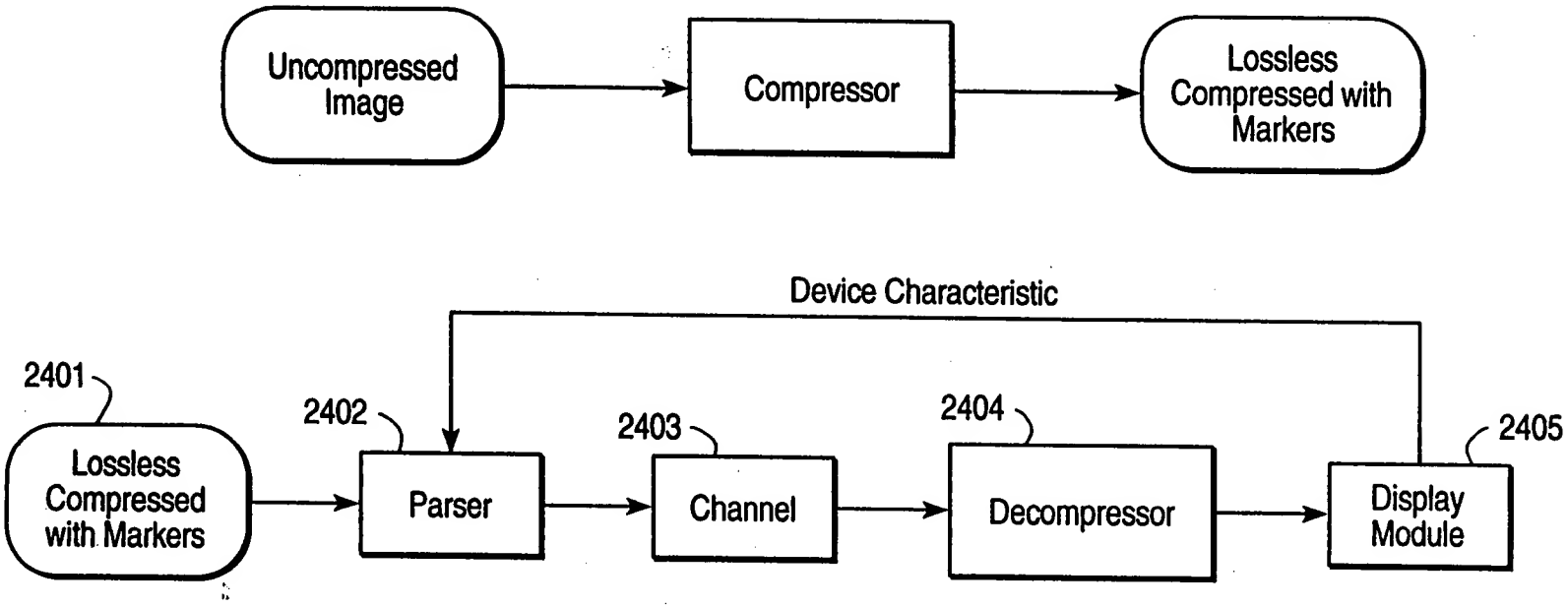

Uncompressed Image
Compressor
Lossless Compressed with Markers
Device Characteristic
2401
Lossless Compressed with Markers
2402
Parser
2403
Channel
2404
Decompressor
2405
Display Module

FIG. 24

6852T0 "ES/9260

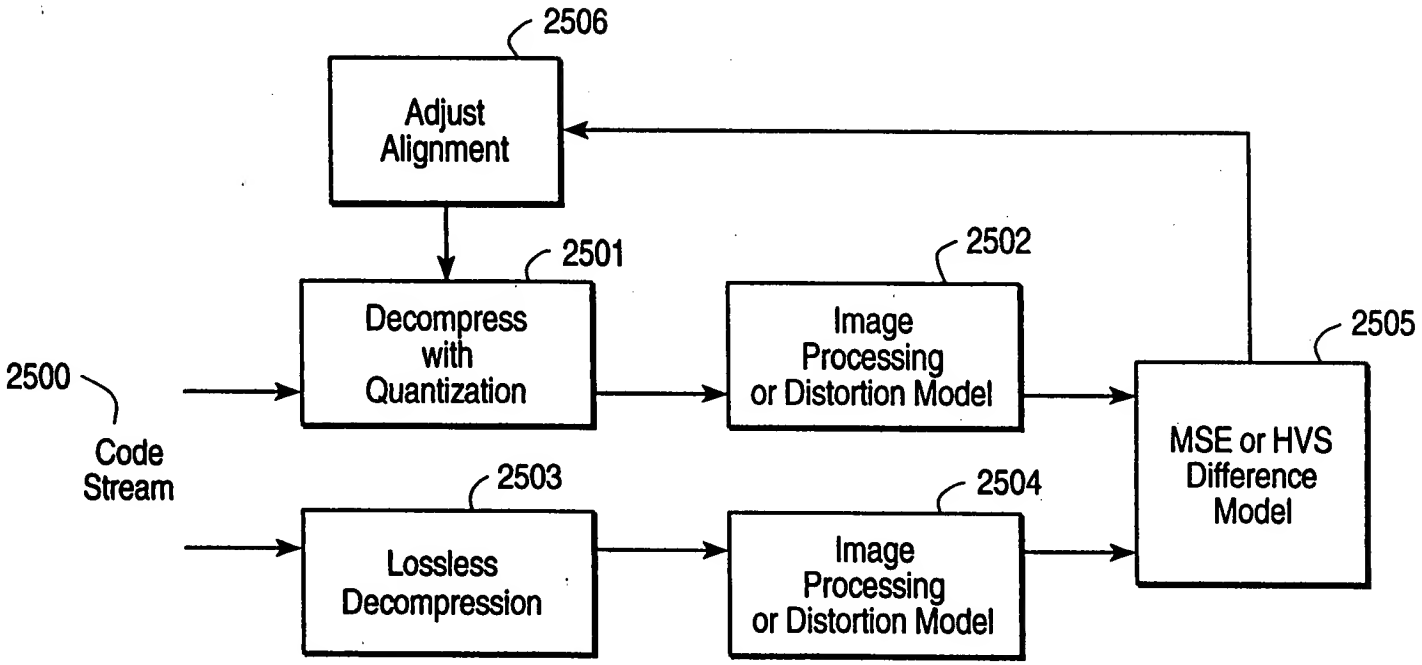


FIG. 25

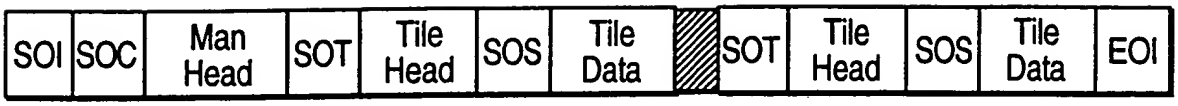


FIG. 26A

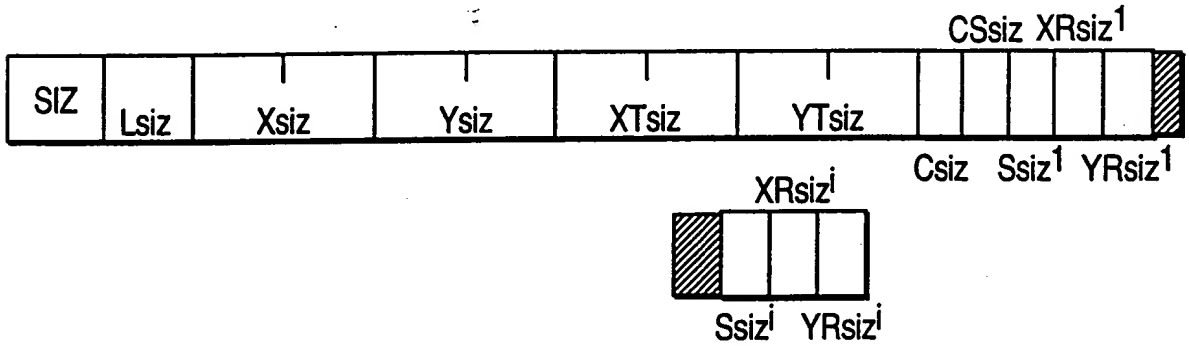


FIG. 26B

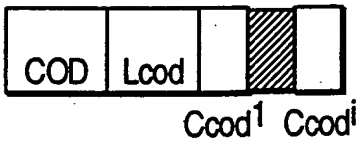


FIG. 26C

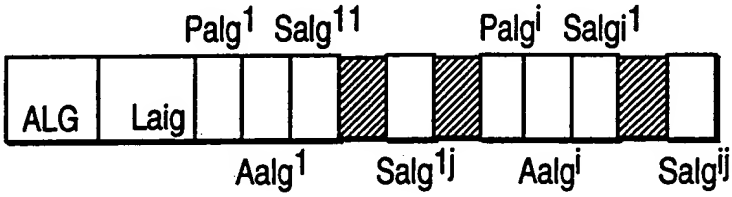


FIG. 26D

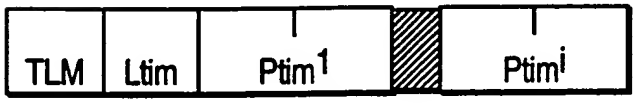


FIG. 26E

FIG. 26F

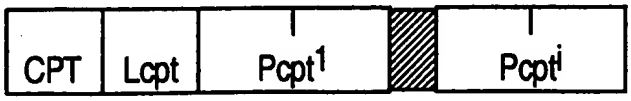


FIG. 26G

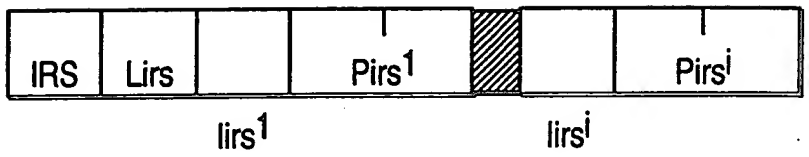


FIG. 26H

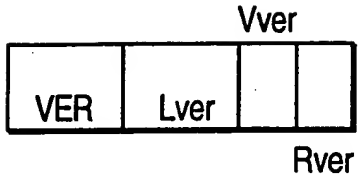


FIG. 26I

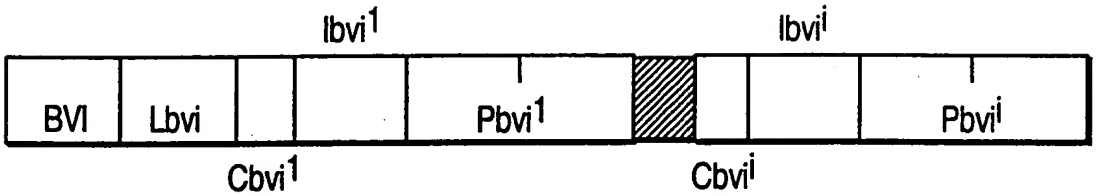


FIG. 26J

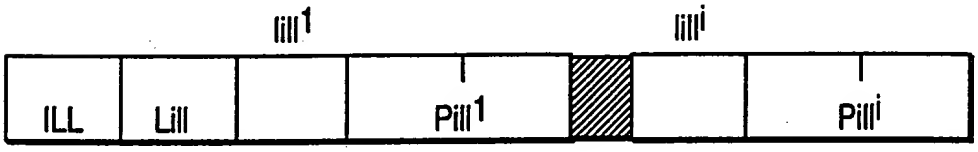


FIG. 26K

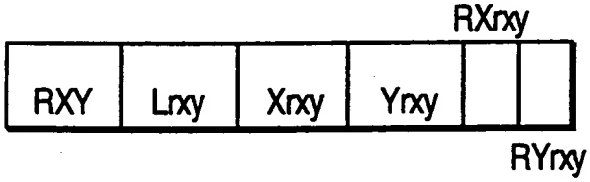


FIG. 26L

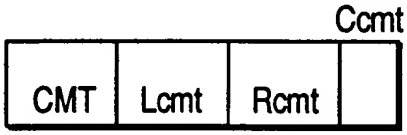


FIG. 26M

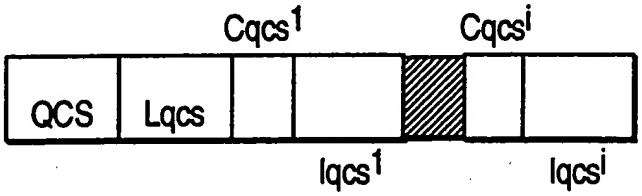


FIG. 26N

86210 ES2982360

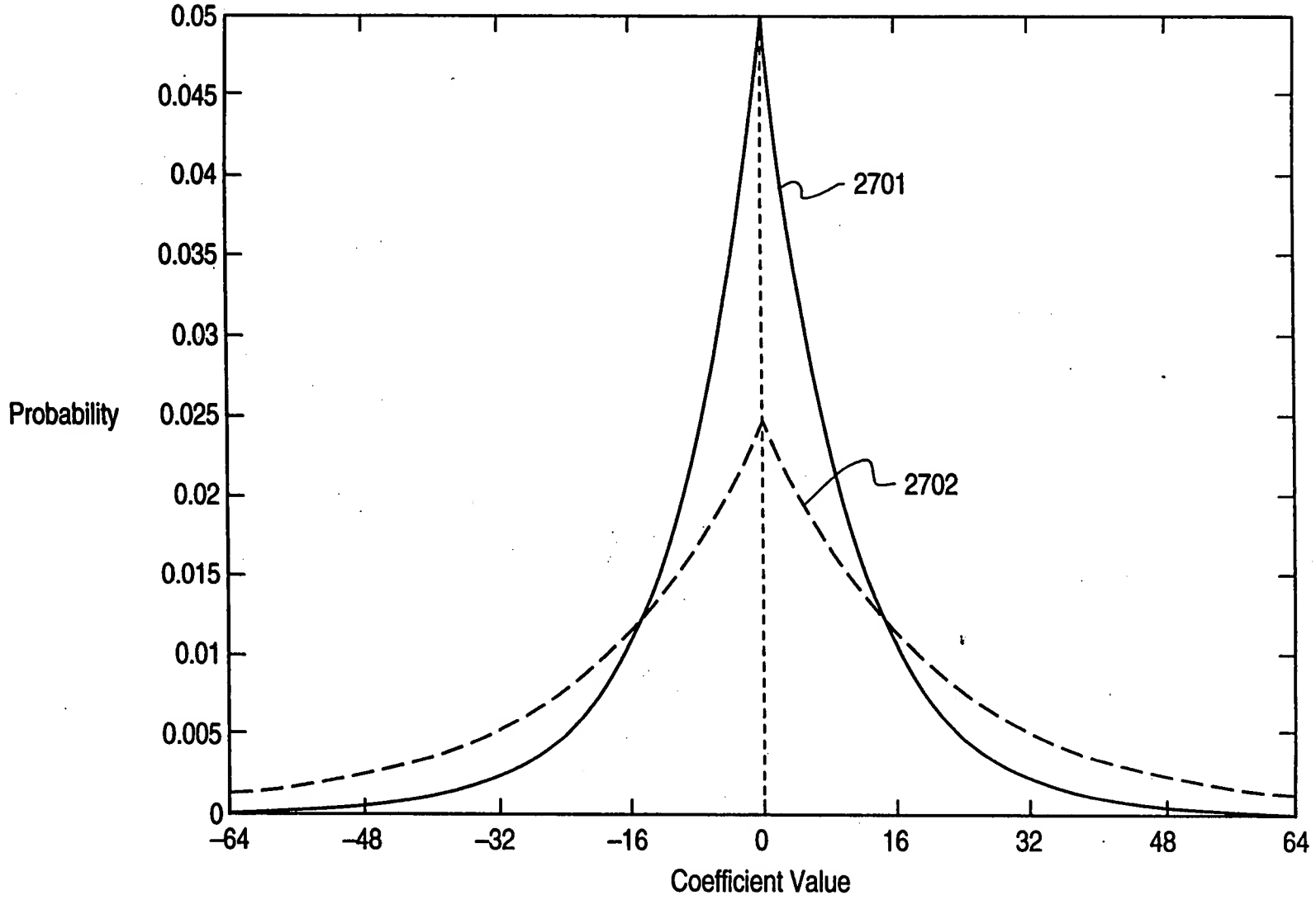


FIG. 27

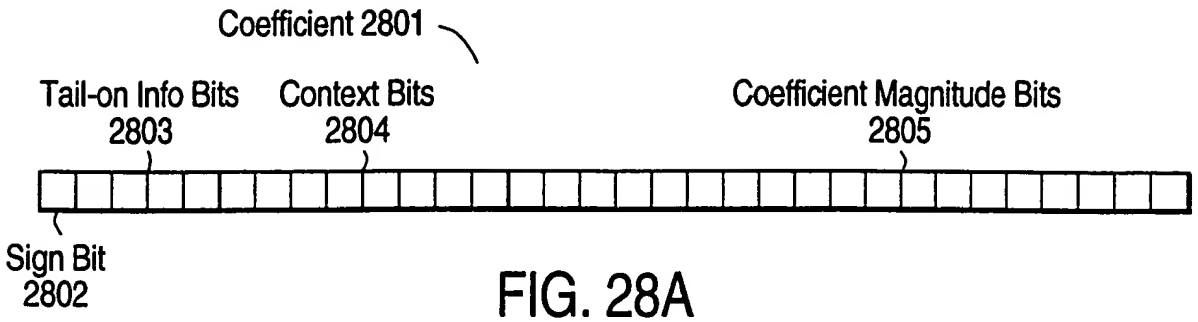


FIG. 28A

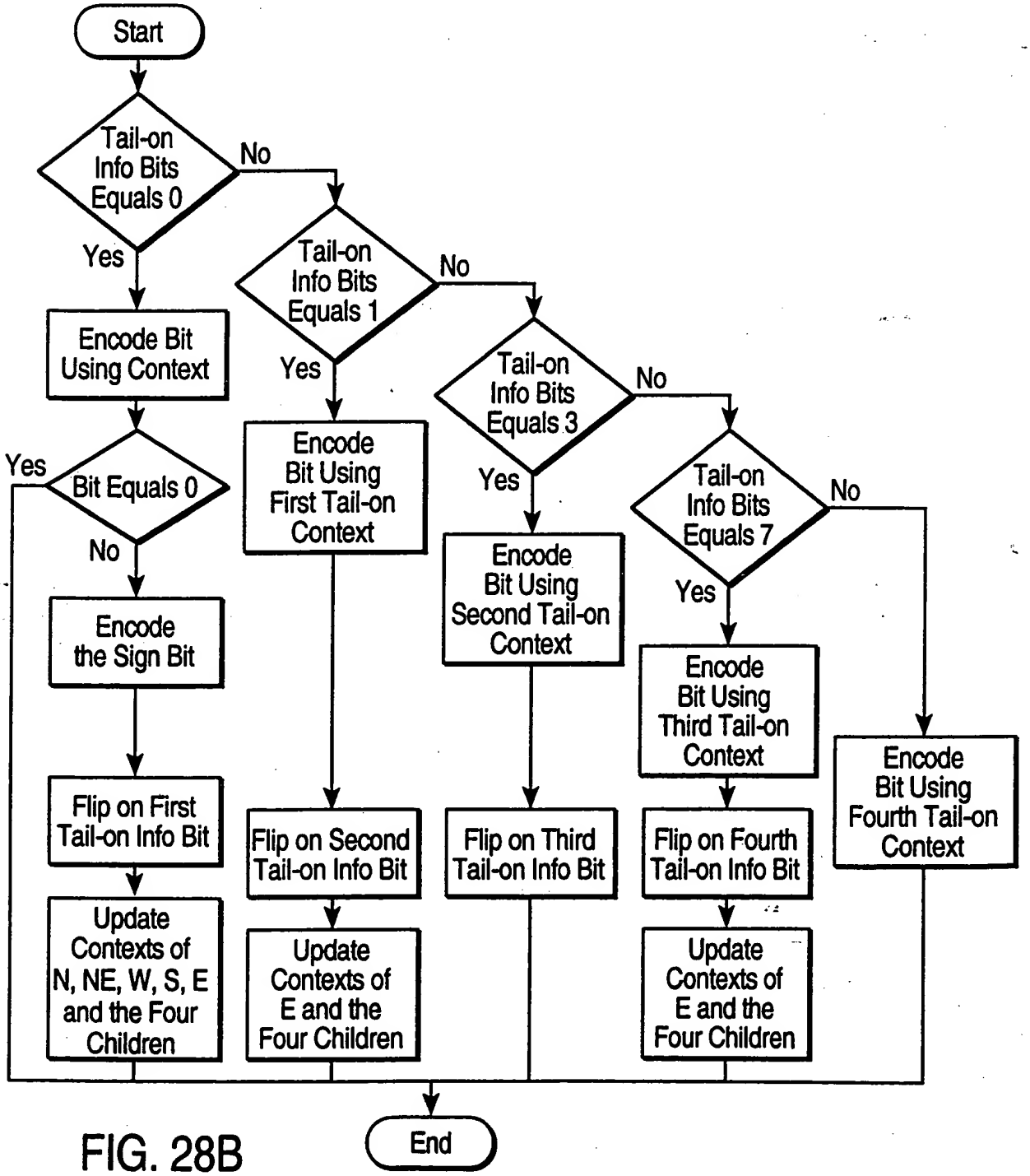


FIG. 28B

6053760 "25/92260

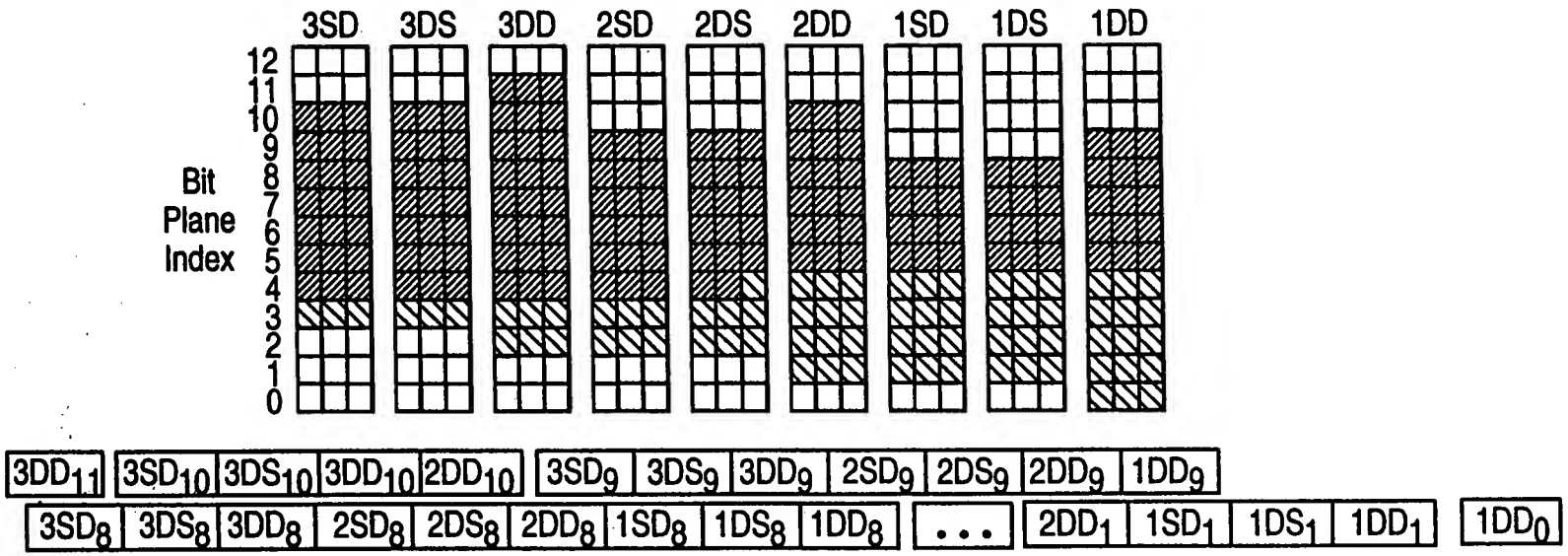


FIG. 29A

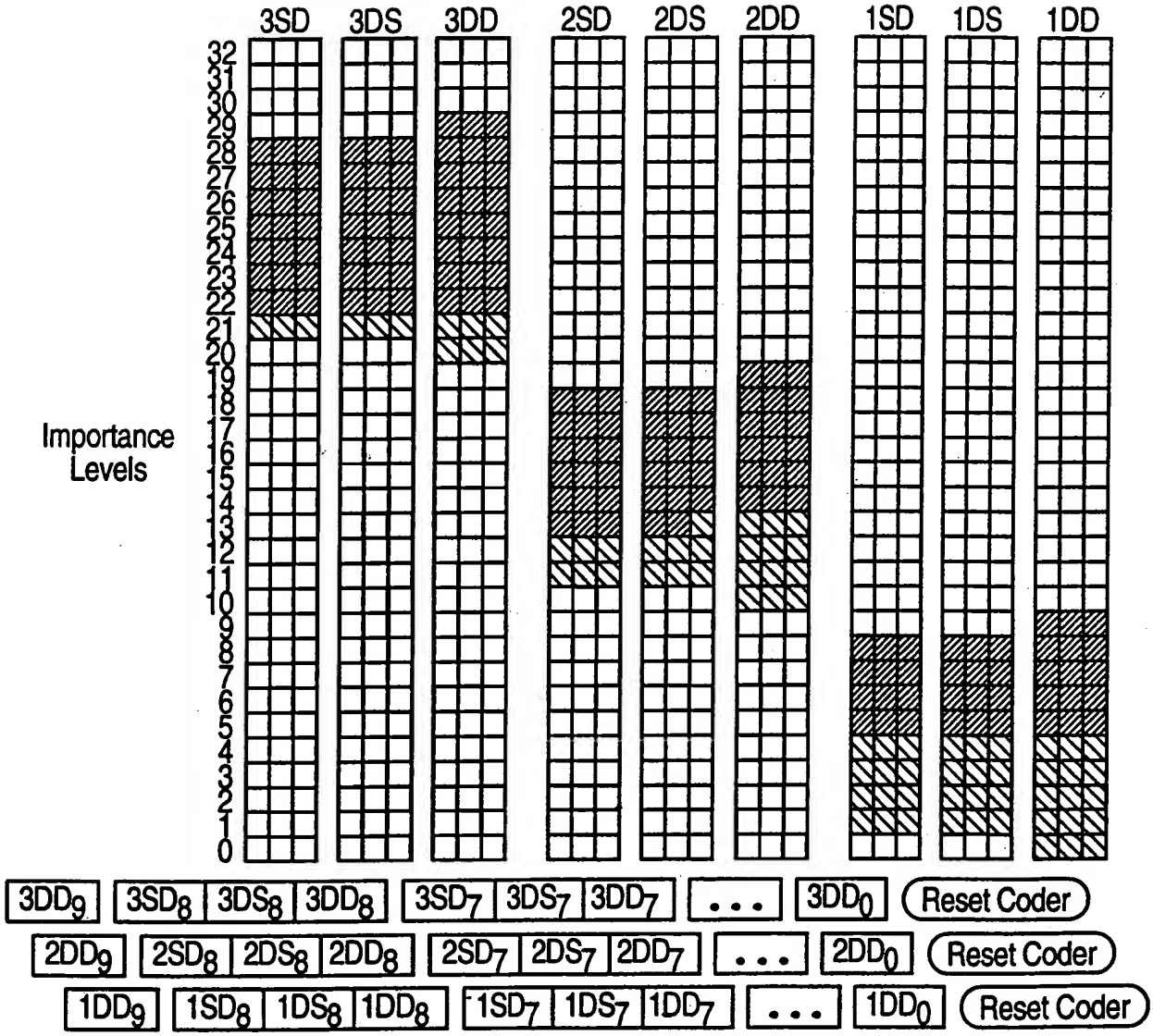

3SD
3DS
3DD
2SD
2DS
2DD
1SD
1DS
1DD
Importance Levels
32
31
30
29
28
27
26
25
24
23
22
21
20
19
18
17
16
15
14
13
12
11
10
9
8
7
6
5
4
3
2
1
0
3DD9
3SD8 3DS8 3DD8
3SD7 3DS7 3DD7
...
3DD0
Reset Coder
2DD9
2SD8 2DS8 2DD8
2SD7 2DS7 2DD7
...
2DD0
Reset Coder
1DD9
1SD8 1DS8 1DD8
1SD7 1DS7 1DD7
...
1DD0
Reset Coder

FIG. 29B

0652T0 ES2962G0

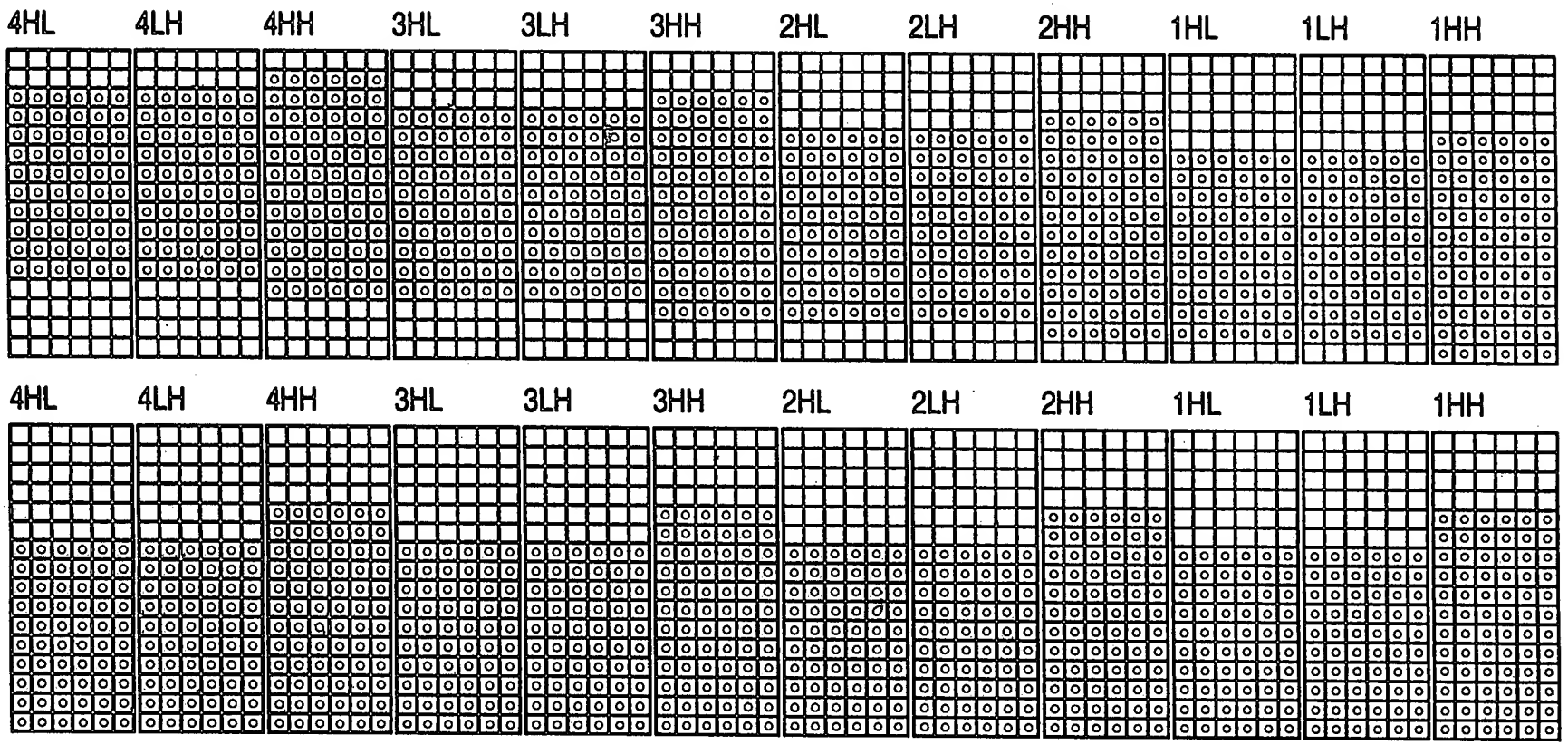


FIG. 29C

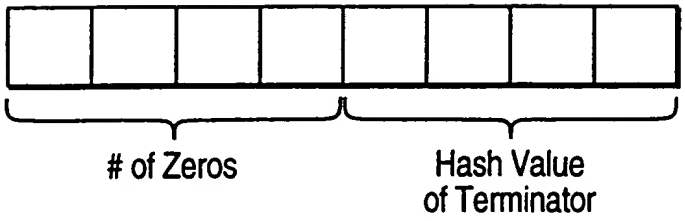


FIG. 30

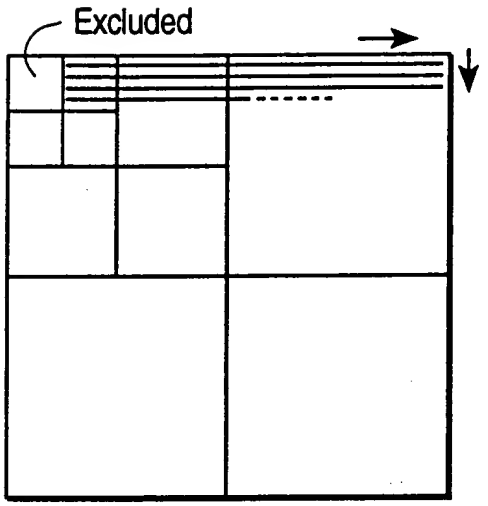


FIG. 31A

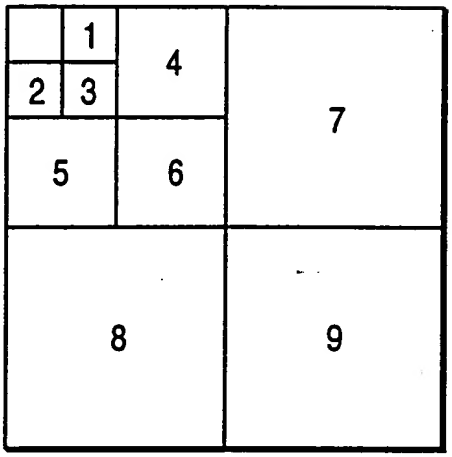


FIG. 31B

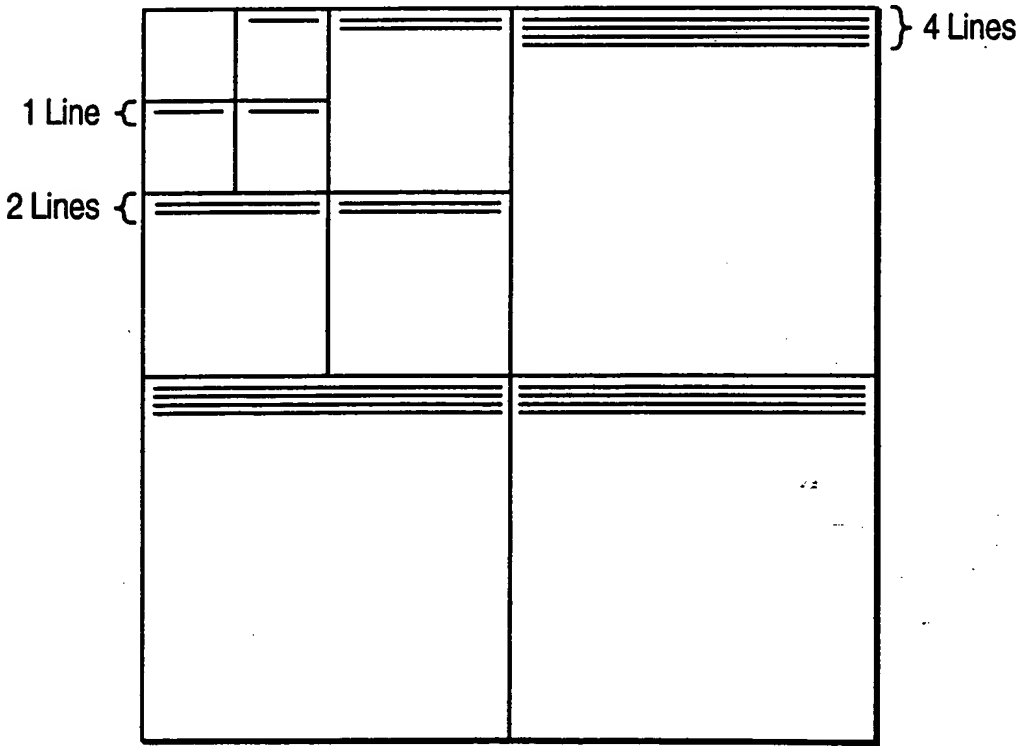


FIG. 31C

1SS	1DS	1SS	1DS	1SS	1DS	1SS	1DS	1SS	1DS	1SS	1DS	1SS	1DS	1SS	1DS
1SD	1DD	1SD	1DD	1SD	1DD	1SD	1DD	1SD	1DD	1SD	1DD	1SD	1DD	1SD	1DD
1SS	1DS	1SS	1DS	1SS	1DS	1SS	1DS	1SS	1DS	1SS	1DS	1SS	1DS	1SS	1DS
1SD	1DD	1SD	1DD	1SD	1DD	1SD	1DD	1SD	1DD	1SD	1DD	1SD	1DD	1SD	1DD
1SS	1DS	1SS	1DS	1SS	1DS	1SS	1DS	1SS	1DS	1SS	1DS	1SS	1DS	1SS	1DS
1SD	1DD	1SD	1DD	1SD	1DD	1SD	1DD	1SD	1DD	1SD	1DD	1SD	1DD	1SD	1DD
1SS	1DS	1SS	1DS	1SS	1DS	1SS	1DS	1SS	1DS	1SS	1DS	1SS	1DS	1SS	1DS
1Sb	1Db	1Sb	1Db	1Sb	1Db	1Sb	1Db	1Sb	1Db	1Sb	1Db	1Sb	1Db	1Sb	1Db

FIG. 32A

2SS	1DS	2DS	1DS	2SS	1DS	2DS	1DS	2SS	1DS	2DS	1DS	2SS	1DS	2DS	1DS
1SD	1DD	1SD	1DD	1SD	1DD	1SD	1DD	1SD	1DD	1SD	1DD	1SD	1DD	1SD	1DD
2SD	1DS	2DD	1DS	2SD	1DS	2DD	1DS	2SD	1DS	2DD	1DS	2SD	1DS	2DD	1DS
1SD	1DD	1SD	1DD	1SD	1DD	1SD	1DD	1SD	1DD	1SD	1DD	1SD	1DD	1SD	1DD
2SS	1DS	2DS	1DS	2SS	1DS	2DS	1DS	2SS	1DS	2DS	1DS	2SS	1DS	2DS	1DS
1SD	1DD	1SD	1DD	1SD	1DD	1SD	1DD	1SD	1DD	1SD	1DD	1SD	1DD	1SD	1DD
2Sb	1DS	2Db	1DS	2Sb	1DS	2Db	1DS	2Sb	1DS	2Db	1DS	2Sb	1DS	2Db	1DS
1Sb	1Db	1Sb	1Db	1Sb	1Db	1Sb	1Db	1Sb	1Db	1Sb	1Db	1Sb	1Db	1Sb	1Db

FIG. 32B